National Institute of Standards & Technology

Certificate of Analysis

Standard Reference Material® 1755

Nitrogen in Low Alloy Steel
(In Cooperation with the American Society for Testing and Materials)

This Standard Reference Material (SRM) is in the form of a disk 35 mm in diameter (1.38 in.) and 19 mm thick (0.75 in.). It is intended for use primarily in optical emission spectrometric methods of analysis.

Nitrogen analyses for value assignment were performed at NIST and cooperating laboratories using sample dissolution-Kjeldahl nitrogen determination, combustion-infrared detection, and vacuum-fusion, gas-volume measurement.

The certified value and uncertainty for nitrogen is reported as a mass fraction [1].

Certified Value of Nitrogen: 118.4 mg/kg ± 1.8 mg/kg

Certified Value and Uncertainty: A NIST certified value is a value for which NIST has the highest confidence in its accuracy in that all known or suspected sources of bias have been investigated or accounted for by NIST [2]. The certified value for nitrogen was determined by combining data from a primary method at NIST with two independent methods from cooperating laboratories. The uncertainty in the certified value is reported as ku_c, where k is the coverage factor for a 95 % confidence level and u_c is the combined standard uncertainty calculated according to the ISO Guide [3]. The value of u_c is intended to represent, at the level of one standard deviation, the combined effect of all the uncertainties in the certified value. Since multiple independent analytical methods were used, the procedure of Schiller and Eberhardt was used to combine the data [4].

Expiration of Certification: The certification of SRM 1755 is valid, within the measurement uncertainties specified, until **01 September 2015**. This certificate is nullified if the SRM is damaged, contaminated, or modified in a manner that is inappropriate for its intended use.

Coordination of the technical work leading to the certification of this SRM was provided by J.D. Fassett of the NIST Analytical Chemistry Division. The analytical measurements made at NIST were performed by C.M. Beck II of the NIST Analytical Chemistry Division.

Cooperative measurements were provided by C.L. Maul of Leco Corp., St. Joseph, MI, and L.W. Ollila and J.P. Flannigan of Luvak, Inc., Boylston, MA.

Statistical analysis of the certification data was provided by H-k. Liu of the NIST Statistical Engineering Division and homogeneity test data was provided by L.M. Gill of the NIST Statistical Engineering Division.

The support aspects involved in the preparation, certification, and issuance of this SRM were coordinated through the NIST Standard Reference Materials Program by N.M. Trahey and C.R. Beauchamp.

Willie E. May, Chief
Analytical Chemistry Division

Gaithersburg, MD 20899
Certificate Issue Date: 08 December 2000

Nancy M. Trahey, Chief
Standard Reference Materials Program

Alloy Preparation and Testing: The material for this SRM was provided by Bethlehem Steel Corp., Bethlehem, PA, and was prepared under the supervision of D.K. Vares of Bethlehem Steel Corp. Special attention was given to the material with regard to the desired nominal concentration of nitrogen (~100 mg/kg), homogeneity, and low titanium concentration; high concentrations of titanium in steel can produce an interference in the optical emission spectrometric determination of nitrogen. Homogeneity testing data were provided by the American Iron and Steel Institute (AISI) Technical Committee on Chemical Analysis under the supervision of D.K. Vares.

Instructions for Use: Measurements should only be made in designated areas of the disk. The certified value is **NOT** valid within an area 1 cm (0.39 in.) in diameter located in the center and less than 5 mm (0.2 in) from the edge of the disk.

REFERENCES

[1] Taylor, B.N., "Guide for the Use of the International System of Units (SI)," NIST Special Publication 811, 1995 Ed., (April 1995).

[2] May, W.E. et al., "Definitions of Terms and Modes Used at NIST for Value-Assignment of Reference Materials for Chemical Measurement," NIST Special Publication 260-136, U.S. Government Printing Office, Washington DC, (2000).

[3] *Guide to the Expression of Uncertainty in Measurement*, ISBN 92-67-10188-9, 1st Ed. ISO, Geneva, Switzerland, (1993); see also Taylor, B.N. and Kuyatt, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results," NIST Technical Note 1297, U.S. Government Printing Office, Washington DC; (1994); available at http://physics.nist.gov/Pubs/.

[4] Schiller, S.B. and Eberhardt, K.R., "Combining Data from Independent Chemical Analysis Methods," Spectrochimica Acta, **46B**, pp. 1607-1613, (1991).

Users of this SRM should ensure that the certificate in their possession is current. This can be accomplished by contacting the SRM Program at: telephone (301) 975-6776; fax (301) 926-4751; e-mail srminfo@nist.gov; or via the Internet http://www.nist.gov/srm.